based ultrasonic scanners are limited to operating regions well below 20 MHz. Furthermore, since the resolution of an ultrasonic transducer depends on its operating frequency, CMUT based ultrasonic scanners can be fabricated with correspondingly improved resolution. For similar reasons, the bandwidth of CMUT based ultrasonic scanners is wider than the bandwidth of PZT based ultrasonic scanners. Accordingly, CMUT based ultrasonic scanners can be applied to more situations than PZT based ultrasonic scanners.

The simpler design and fabrication of CMUT based ultrasonic systems (as compared with PZT based ultrasonic transducers) also gives rise to certain advantages. For instance, since the ICs used to support the CMUTs and the CMUTs themselves can be fabricated with the same techniques, fabrication of the CMUTs and ICs, taken together, can be simplified. Additionally, because CMUTs do not require matching or backing layers, the manufacturing steps associated with these layers can also be eliminated. Likewise, steps associated with integrating the CMUTs and the ICs can be eliminated or, if not, simplified.

The present disclosure is described with reference to specific embodiments thereof, but those skilled in the art will recognize that the present disclosure is not limited thereto. Various features and aspects of the above-described disclosure may be used individually or jointly. Further, the present disclosure can be utilized in any number of environments and applications beyond those described herein without departing from the broader spirit and scope of the specification. We claim all such modifications and variations that fall within the scope and spirit of the present disclosure. The specification and drawings are, accordingly, to be regarded as illustrative rather than restrictive.

What is claimed is:

1. A method of packaging an ultrasonic system, the method comprising:

disposing, on a substrate, a capacitive micromachined ultrasonic transducer (CMUT) and an integrated circuit (IC);

applying an insulation layer of a first material and a conductive layer of a second material to the substrate and at least one of the CMUT or the IC;

removing the substrate to obtain a subassembly comprising:

the insulation layer,

the conductive layer,

the CMUT, and

the IC; and

shaping the subassembly to have at least one curved part.

2. The method of claim **1** wherein the first material is a flexible polymer.

3. The method of claim **1** wherein at least one of the CMUT or the IC is disposed on the substrate by being placed into a structure formed on the substrate.

4. The method of claim **1** wherein at least one of the CMUT or the IC is disposed on the substrate by being fabricated on a device layer of the substrate before the applying the insulation layer and the conductive layer.

5. The method of claim **4** further comprising forming a trench in the device layer of the substrate to define a portion of a boundary of at least one of the CMUT or the IC.

6. The method of claim **5** further comprising forming the device layer with at least one embedded cavity.

7. The method of claim **4** further comprising forming the device layer on a SOI wafer, wherein the substrate comprises at least the device layer and the SOI wafer.

8. The method of claim **1**, wherein:

the applying the insulation layer comprises applying the insulation layer, at least partially, over the IC and the CMUT to mechanically connect the CMUT and the IC; and

the applying the conductive layer comprises applying the conductive layer to electrically connect the CMUT and the IC.

9. The method of claim **1** wherein the disposing comprises fabricating the CMUT on the substrate prior to the applying the insulation layer and the conductive layer, the method further comprising connecting the IC to the conductive layer on a side of the insulation layer opposite to the CMUT.

10. The method of claim **1** wherein the shaping the subassembly further comprises shaping the subassembly to define a lumen or a partial lumen.

11. The method of claim **1** the method further comprising forming a through-wafer interconnect in the CMUT, wherein the at least one conductive layer is on a side of the CMUT that does not include an active surface of the CMUT.

12. The method of claim **1** further comprising attaching the shaped subassembly to a lumen.

13. The method of claim **1** wherein the CMUT includes an array of CMUTs.

14. The method of claim **1**, wherein the shaping further comprising folding a portion of the at least one insulation layer and the at least one conductive layer to form a forward looking ultrasonic transducer.

15. The method of claim **1** wherein:

at least prior to the shaping, the CMUT includes at least a portion of a circular CMUT array.

16. The method of claim **1** wherein the insulation layer and the conductive layer make up at least a portion of a flexible member, such that one of the IC or the CMUT is integrated on a first side of the flexible member, the method further comprising integrating the other one of the IC or the CMUT on an opposite side of the flexible member.

17. An ultrasonic system comprising:

a plurality of electronic integrated circuits (ICs);

an ultrasonic transducer; and

a flexible member extending between and integrated with the ICs and the ultrasonic transducer, the flexible member including at least one insulation layer and at least one conductive layer,

wherein the flexible member is shaped into a folded configuration so that at least one of the ICs is stacked over another one of the ICs, the ultrasonic transducer is stacked over the stacked ICs, and at least a portion of the flexible member defines a layer between the ultrasonic transducer and the stacked ICs.

18. The system of claim **17** wherein the flexible member includes at least one layer of a flexible polymer.

19. The system of claim **17** wherein the flexible member includes:

a first flexible insulation layer,

a flexible patterned conductive layer including a plurality of interconnects between the ICs and the ultrasonic transducer, and

a second flexible insulation layer, such that at least a portion of the conductive layer is between the first flexible insulation layer and the second flexible insulation layer.

20. The system of claim **17** wherein the ultrasonic transducer includes a through-wafer interconnect.

21. The system of claim **17** wherein the ultrasonic transducer includes at least one capacitive micromachined ultrasonic transducer element.